Evidence Collection, Preservation, and Chain of Custody

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Introduction

This article focuses on proper collection, packaging, documentation, transportation, storage, and disposal of physical evidence that is or may become involved in litigation. Spoliation issues are also addressed. Many other articles and conference presentations make brief mention of the importance of avoiding evidence spoliation, but few, if any, specifically address how to properly perform the total life cycle of evidence. Proper evidence handling procedures are not particularly difficult, but are frequently not done correctly. Here, we detail the procedures specified in the American Society for Testing and Materials International (ASTM) standards and other resources that technical investigators need to follow to assure all interested parties that the physical evidence presented for examination and/or testing has the same evidentiary value to that found at the loss scene. Examples of well-preserved and poorly preserved (spoliated) evidence will be presented that illustrate these techniques.

Background

The ASTM has a variety of peer-reviewed, industry-accepted, and clearly written standards that define correct procedures that should be used by anyone responsible for evidence that is or may become involved in criminal or civil litigation. The examples used in this article generally focus on electrical evidence found at fire scenes, but the techniques described can be used for most cases involving physical evidence.

To begin, what is physical evidence? NFPA 921 states:

16.2.1 Physical evidence is any physical or tangible item that tends to prove or disprove a particular fact or issue. Physical evidence at a fire scene may be relevant to the issues of the origin, cause, spread, or the responsibility for the fire.¹

Examples include electrical wiring, appliances, machinery, mechanical pieces, burned portions of a structure that show relevant burn patterns, or a variety of other physical objects that help identify the cause and/or the responsible party in a loss. Physical evidence can be of any size from nearly microscopic to that which fills large trucks.

Several experts at a loss site may each have somewhat different opinions as to what they would like to collect as evidence. The total body of evidence collected should reflect the summation of all the expert’s opinions.
Who "Owns" The Evidence At A Loss Site?

This question arises at nearly every site investigation. Generally, the expert representing the owner of the physical evidence becomes the first custodian of the evidence. For example, in a tenant-occupied residence, if an electrical extension cord, a multi-outlet strip, and an electric heater were desired as physical evidence, the expert representing the tenant (or their insurance company and/or attorney) would become the custodian. But, in the same situation, if a length of electrical branch circuit wiring and its associated circuit breaker were desired as physical evidence, the expert representing the homeowner or building owner would become the custodian. Verbal discussions at site examinations may vary this guideline due to specific circumstances. For example, if the evidence is very large or heavy, one expert may have more appropriate storage facilities or equipment to handle the evidence. In this case, agreements between the experts and their clients may allow a change in the normal protocol.

Spoliation

Physical evidence is frequently delicate and easily damaged. For example, heat from a fire frequently makes electrical conductors very brittle so they are easily broken if bent or twisted. The expert collecting the evidence must be very careful to avoid spoliation. ASTM E 860-07 defines spoliation:

The loss, destruction, or material alteration of an object or document that is evidence or potential evidence in a legal proceeding by one who has the responsibility for its preservation. Spoliation of evidence may occur when the movement, change or destruction of evidence, or alteration of the scene significantly impairs the opportunity of other interested parties to obtain the same evidentiary value from the evidence as did any prior investigator.²

Evidence collection can frequently resemble an archeological dig, particularly at a large fire scene, where layers of debris have fallen to the floor. Unwanted debris must be removed carefully to avoid permanently damaging potential evidence that may be present in lower layers. It is easy to unintentionally spoliate valuable evidence by stepping on it in a dark room. Tools as small as dental picks are sometimes used to separate valuable evidence from unwanted debris. Again, great care and attention must be used to avoid spoliation.

Evidence Collection and Packaging³

Remember that every piece of evidence is potentially worth far more than its replacement value before the loss! Each piece of evidence could be the "key" piece that establishes cause of the loss and/or the responsible party. Thus, it could have a potential value as high as the value of the resulting lawsuit. It is always prudent to collect every piece of evidence
that could be reasonably expected to have evidentiary value. Once the loss site is "released" for demolition, it is permanently gone, and all its remaining evidentiary value is lost, except what was recorded in photographs. The expert must be careful to collect all needed evidence at his first (and frequently, his only) opportunity.

The desired evidence should be completely photographed before it is removed from its location at the loss site. This is to record the "in-situ" nature of the evidence – its appearance, location, angular position relative to other objects, etc.

Rolled stretch wrap is frequently used to completely package awkward or bulky evidence. The stretch wrap also helps make the evidence more resistant to spoliation during handling and transportation.

Special plastic bags, specifically designed for liquid and solid accelerant evidence from fire scenes, can be used. Unlike common plastic bags, these special evidence bags do not have a chemical composition that can cause erroneous test results during laboratory examination for the presence of accelerants.

New, clean metal paint cans (quart or gallon size) are most commonly used for fire debris samples when accelerant testing is required. These metal cans are readily available, economical, and prevent loss of volatile chemicals through evaporation. However, they can rust depending on moisture level of the evidence, resulting in loss of evidence. Some experts use plastic bags to line the inside of the can to avoid this problem.

Glass jars can also be used for liquid and solid evidence. However, glass jars may break if dropped, resulting in evidence loss and/or contamination.

Common polyethylene plastic bags can be used to contain small electrical or mechanical items, etc., where there is generally no concern about the presence of accelerants. The bag will help protect delicate contents and avoid loss.

Cardboard boxes can be used, but evidence should not be packaged directly in packing material such as "peanuts" or shredded paper, but first placed in a proper bag or container to avoid loss of small items. Preferably, the evidence should be covered in stretch wrap first and then stored in the cardboard box.

If the evidence must be cut to remove it from the site, labels should be applied to all cut ends indicating their original locations. This happens frequently when, for example, lengths of electrical wiring must be removed from a site. Each end must be cut to remove it. An example of typical labeling is shown in Figure 1.
Electrical wiring can become very delicate if exposed to the heat of a fire. Stranded wiring taken as evidence is frequently supported on wooden supports with plastic tie-wraps as shown in Figure 2 to reduce the possibility of spoliation. Also, electrical evidence can be mounted on sections of cardboard as shown in Figure 3.
Figure 2. Example of an electrical evidence tie-wrapped to wooden support to minimize damage risk.
After packaging, the evidence should be re-photographed to record its final condition prior to transport. This is important, so the physical condition of the evidence present at a future laboratory inspection can be compared to the original condition at the site. Also, these photographs should include all details written on the evidence labeling.

**Evidence Package Labeling**

Each package of evidence should be labeled with the following information:

- A unique alphanumeric identifier. Whenever possible, sequential numbers should be used for evidence associated with a particular loss site. The case or incident number should also be listed.
- The location and condition of each evidence item prior to collection.
- Identification of the person who collected the evidence.
- The date the evidence was collected.
- A brief description of the evidence.\(^4, 5, 6\)

A general form may be used for this, as shown in Figure 4. This form should be securely taped to the evidence package. Then, packing tape should be placed completely over the form to preserve it from rain damage, fading from sunlight exposure, etc.
Some experts use tie-on shipping tags to record this information, or some other method. Do not rely on adhesive paper labels – the adhesive will dry out, particularly if exposed to sunlight, and the label may fall off the package. The important point is that the label should be as permanent as possible, so its recorded information will not be lost even after years of storage.

Figure 4. Typical evidence label.

An example of excellent evidence packaging and labeling is shown in Figure 5. An example of obviously spoliated evidence is shown in Figure 6.
Figure 5. Example of well-documented and packaged evidence.
Figure 6. Example of spoliated evidence.
Chain of Custody Form

Evidence and information gathered by investigators must be admissible in the event of litigation. Validity and authenticity must be established and the chain of custody must be traceable. A sample chain of custody (or evidence transfer) form is shown in Figure 7. This form should be placed in the expert’s permanent project records, and be made available at future laboratory inspections. It should be signed and dated by the first evidence collector, and subsequently by anyone else assuming custody of the evidence in the future.
## Chain of Custody form

Forensic Engineers, Inc. File Number:  

File Description:  
(Name, address)  

<table>
<thead>
<tr>
<th>Item Name/#</th>
<th>Description</th>
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</tbody>
</table>

**Items Obtained from Source By:**  Date:  

**Items Relinquished By** (print & sign)  **Items Received By** (print & sign)  Date  

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*Figure 7. Typical chain of custody form.*
The chain of custody form should always be updated when the evidence changes custodian. For example, several fire debris samples may require analysis in a forensic chemical testing laboratory. The expert should place the chain of custody form in the shipping box with the evidence, and keep a copy in his project files. Then, the chemist (or his assistant) should sign and date the chain of custody form when he receives the evidence in his laboratory. If the debris samples are later returned to the expert, the chain of custody form should show his name and signature, showing he released custody back to the expert. That way, a complete historical record of custody is maintained throughout the life of the case.

**Evidence Transportation**

Evidence transportation should be minimized due to the risk of damage or loss.

Evidence, such as fire debris requiring accelerant testing, frequently must be shipped to an off-site forensic chemistry laboratory. Evidence that must be shipped should be sent by a carrier service that offers a tracking system (e.g. FedEx). This may be the only recourse if the evidence never arrives at its destination.

Otherwise, evidence should be delivered by the expert or his designee to ensure its arrival. Most experts use a large pick-up truck to perform this. A cap on the truck bed will protect the evidence from rain and wind, but it also limits the vertical height of the evidence. This becomes important when transporting refrigerators, upright freezers, kitchen stoves, etc. An open truck bed is most practical, but tarps should be used if the evidence could be vulnerable to rain or wind damage. Also, the evidence should be safely secured in place if there is any risk of the evidence blowing out of the bed during driving.

Several companies exist that specialize only in evidence transportation and storage. This is a very useful option for very large or heavy pieces that require custom packaging and transportation over long distances. Also, these companies frequently offer specialized evidence packing materials, such as:

- Extra heavy tamper evident stretch wrap. The only removal method is to cut it with a knife.
- Tamper evident tie-wraps that can only be removed by cutting with a knife.
- Custom packaging and security such as wooden crates with multiple locks, each controlled with a different key. Each party involved in the case is supplied with a different key. This ensures that the evidence is only opened at a joint laboratory inspection with all parties present.

These types of security measures are used if the parties involved feel the evidence is of very high potential value in an expected lawsuit. An example of this type of situation is a loss that results in one or more fatalities.
These companies frequently also have extensive evidence storage facilities and specialized material handling equipment, such as vehicle lifts and forklifts to facilitate inspections of very large or heavy items.

**Evidence Storage**

A quality evidence storage facility offered by an expert should include:

- A high level of security and fire protection. Remember, the evidence could be the single most valuable item in your case. Spoliation of the evidence could cripple the chances for subrogation recovery.
- A complete inventory control system. This ensures that the expert can quickly and accurately associate the correct evidence with the correct project information. This is critically important when the expert has custody of hundreds or thousands of evidence pieces. The inventory system should be reviewed and updated as necessary.
- A complete record of all chain of custody forms. A lost chain of custody form means the authenticity of the evidence cannot be established.
- An organized storage warehouse. This ensures that evidence can be stored indefinitely without significant risk of loss or damage.
- A completely enclosed building. This means that evidence can be stored without risk of environmental damage, particularly from rain and sun exposure. Evidence wrapped in standard stretch wrap is water resistant, but not water proof. Evidence labels frequently fade from sun exposure and are eventually unreadable.
**Evidence Disposition**

Evidence disposition refers to the final movement of the evidence when the case is closed. Sometimes it is returned to the owner, but most frequently it is disposed of. Evidence disposal is an important but frequently overlooked subject. Evidence should not be disposed of until proper authorization has been received. This should be a written signature from the most appropriate representative of the client – generally an insurance company or attorney. Disposing of evidence based on any other reason is surrounded with risk. Some evidence may need to be retained for many years, and ultimately returned to the owner. The expert must be cautious that proper authorization has been received prior to disposal.

Evidence disposal has become more complicated in recent years with enhanced environmental laws restricting disposal of metal products, etc. Refrigerators, freezers, and HVAC units require special disposal handling, generally at increased cost compared to other items. It is becoming quite common for the expert to charge an up-front disposal fee to the client before evidence storage begins. That ensures the expert will not need to bear the final cost of disposal when the case closes.

**Summary**

Proper evidence collection, preservation, and chain of custody procedures are not difficult, but they are frequently not fully implemented. It does require diligent adherence to ASTM standards to ensure that the evidence is processed from initial collection to final disposition in an orderly fashion to ensure maximum evidentiary value. Generally, loss sites can only be visited once. When all potentially valuable evidence is properly gathered, documented and processed, the case has a far greater chance of a favorable outcome.

**References**


3. The content for this section was developed from the author’s experience and related information found in Chapter 16 of NFPA 921. See Reference 1.


7. See Reference 4.